

**FEDERAL AID  
ANNUAL RESEARCH PERFORMANCE REPORT**

ALASKA DEPARTMENT OF FISH AND GAME  
DIVISION OF WILDLIFE CONSERVATION  
PO Box 25526  
Juneau, AK 99802-5526

**PROJECT TITLE:** Preparation of manuscripts on wolf ecology in Interior Alaska

**PRINCIPAL INVESTIGATOR:** Mark E. McNay; Bruce Dale, Tom Stephenson, Jay Ver Hoef

**COOPERATORS:** None

**FEDERAL AID GRANT PROGRAM:** Wildlife Restoration

**GRANT AND SEGMENT NR:** W-33-2

**PROJECT NR:** 14.22

**WORK LOCATION:** Game Management Unit 20A

**STATE:** Alaska

**PERIOD:** July 1, 2003-June 30, 2004

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**I. PROGRESS ON PROJECT OBJECTIVES SINCE PROJECT INCEPTION**

**OBJECTIVE 1:** Prepare a scientific manuscript on reproductive characteristics of an exploited wolf population.

Field work on a study of wolf population response to intensive trapping occurred between March 1995 and June 2001. Data analysis of that study continued into 2004. McNay presented some aspects of that study at the World Wolf Congress held in Banff, Alberta in September 2003 under the title, "Reproductive Characteristics of an Exploited Wolf Population." The final federal aid performance report (McNay 2002) was submitted in August 2002. Further data analysis and manuscripts preparation continued during the current reporting period July 1, 2003 to June 30, 2004.

**OBJECTIVE 2:** Prepare a scientific manuscript on the use of periodic sampling to estimate predation rates by wolves on moose and caribou during winter.

Field work on the predation rate study occurred in winters 1998–99 and 2000–2001. Data entry and analysis for that project continued into 2002. In April 2003, McNay presented the results of the study at the North American Interagency Wolf Conference in Pray, Montana

Edited Oct-04

Please note: This is a progress report and the information contained within may be further analyzed and refined.

(Abstract in Appendix) and submitted the federal aid final performance report in August 2003 (McNay et al. 2003).

OBJECTIVE 3: Identify if multiple paternity existed among multiple litter wolf packs that were identified during federal aid study 14.17.

Between 1993 and 2001 we obtained tissue or hair samples from wolves harvested in Game Management Unit 20A and whole blood samples and hair samples from live captured wolves. Samples were frozen and stored until being shipped to a genetics laboratory for analysis during June and October 2003. The laboratory analysis of the samples successfully identified 22-locus genotypes for 123 wolves, resulting in identification of mother-father pairs for 66 offspring. Further analysis of results for possible multiple paternity will occur during the next reporting period.

## **II. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD**

### **JOB 1: Prepare 2 manuscripts for publication in scientific journals**

During this reporting period McNay completed a draft of the first manuscript under the working title, "Diagnoses of pregnancy, litter size, and gestational age with ultrasound in wild free-ranging wolves." The draft manuscript is currently being reviewed within the Department. (Abstract in Appendix).

McNay also made progress on a second draft manuscript under the working title "Reproductive characteristics of an exploited wolf population." Results from that manuscript were compiled and presented at the World Wolf Congress held in Banff, Alberta in September 2003 (Abstract in Appendix).

No additional progress was made on a 3<sup>rd</sup> manuscript entitled "Estimating predation rates by wolves during winter with periodic sampling."

### **JOB 2: Analysis and report on paternity testing for wolves.**

Skin and Blood samples from 123 wolves were submitted to a genetics laboratory for analysis during June and October 2003. The laboratory analysis of the samples was completed in January 2004. The analysis included complete 22-locus genotypes for each wolf and resulted in identification of mother-father pairs for 66 offspring. Preparation of a report by the principal investigator on additional familial relationships revealed by this analysis will be deferred until manuscripts described in Job 1 are completed.

### **III. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD**

Material from both reproductive characteristics manuscripts was reformatted for a multi-media presentation at the Science for Alaska Public Lecture Series sponsored by the University of Alaska. McNay developed that presentation and gave the lecture in Fairbanks and Anchorage during February 2003.

### **IV. PUBLICATIONS**

No publications were submitted during this reporting period.

### **V. RECOMMENDATIONS FOR THIS PROJECT**

### **VI APPENDIX**

#### **LITERATURE CITED**

**McNAY, M.E.** 2002. Investigation of wolf population response to intensive trapping in the presence of high ungulate biomass, 1 July 1997–30 June 2002. Alaska Department of Fish and Game. Federal aid in wildlife restoration research final performance report, grants W-27-1 to W-27-5, project 14.17. Juneau, Alaska.

**McNAY, M.E. and JM VER HOEF.** 2003. Predation on moose and caribou by a regulated wolf population, 1 July 2000–30 June 2003. Alaska Department of Fish and Game. Federal aid in wildlife restoration research final performance report, grants W-27-4 to W-33-1, project 14.19. Juneau, Alaska.

### **Diagnosing Pregnancy, Inutero Litter Size, and Gestational Age with Ultrasound in Wild Free-Ranging Wolves.**

Mark E. McNay, Thomas Stephenson, and Bruce Dale

Alaska Department of Fish and Game, Fairbanks, AK 99701 (MM)

California Department of Fish and Game, Bishop CA (TS)

Alaska Department of Fish and Game, Palmer, AK 99645 (BD)

**Abstract:** We used ultrasound to diagnose pregnancy, litter size and fetal gestational age among wild free-ranging wolves in central Alaska. During their 2<sup>nd</sup> trimester of pregnancy, 68 adult female wolves were captured, radio collared and examined with portable ultrasound equipment using a 5mhz transducer. Forty-nine females were diagnosed as pregnant. We monitored radio collared females from the air beginning in early April to detect denning activity. Distance from the den tended to decline as parturition approached ( $r=-0.28, p<0.01$ ). Some females briefly visited dens as early as 13 days before parturition, but

none localized near dens prior to their abrupt confinement to a den. Putative parturition dates were established based upon the date of confinement. Seventy-eight percent of pregnant females entered and maintained dens, 7% denned but abandoned the den within 1 week, and 15% failed to enter dens. None of the females diagnosed as non pregnant entered dens. Inutero litter sizes detected by ultrasound ranged from 1-9 pups. We obtained post mortem estimates of litter sizes from embryo or placental scar counts in 14 females that died within 10 months after being examined by ultrasound. In that paired sample of ultrasound and post mortem litter counts, 100% agreed in the diagnoses of pregnancy, 57% agreed exactly in fetal count, 86% agreed in fetal count within 1 fetus, and 100% agreed within 2 fetuses. With ultrasound we measured embryonic vesicle diameters (EVD) or crown rump length (CRL) of 29 inutero fetuses and established models of fetal growth. CRL proved a better predictor of gestational age ( $r^2=0.91$ ) than did EVD ( $r^2=0.64$ ). The CRL model closely matched published data from dogs weighing greater than 40kg. We did not detect evidence that capture of females during the second trimester of pregnancy affected denning or productivity. Risks to the safety of females were those inherent to all captures of free ranging wolves and not specifically associated with the ultrasound examination. Pup production in our sample population was similar to that in an adjacent population that was not examined by ultrasound.

**Reproductive Characteristics of an Exploited Wolf Population**  
**Presented by Mark McNay at the World Wolf Congress, Banff Alberta**  
**September 2003**

Mark McNay, Tom Stephenson, Bruce Dale, and Jay Ver Hoef

Alaska Department of Fish and Game, Fairbanks, AK 99701 (MM)

California Department of Fish and Game, Bishop CA (TS)

Alaska Department of Fish and Game, Palmer, AK 99645 (BD)

Alaska Department of Fish and Game, Fairbanks, AK 99701 (JV)

**Abstract:** In most wolf packs a single reproductively dominant female produces pups. However, examination of reproductive tracts collected from heavily hunted and trapped wolf populations in Alaska suggested higher pregnancy rates occurred in exploited populations. To assess the role of exploitation in stimulating high pregnancy rates and to estimate the contribution of auxiliary females to net productivity we captured, radio marked and closely monitored female wolves from an exploited wolf population in interior Alaska. We darted wolves from a helicopter, and performed 68 ultrasound scans for pregnancy over a 4-year period (1996-1999). Ninety four percent of primary (i.e. alpha) females (n=31) were pregnant. Annual pregnancy among auxiliary females ranged from 40% - 80% and was highest following intensive trapping. An estimated 53% of auxiliary female pregnancies contributed pups to summer wolf populations. Fourteen of 36 annual wolf packs contained more than one pregnant female; in each of 2 packs at least 4 females were pregnant. At least 6 of the 14 multiple pregnancy packs produced surviving, multiple litters. Overall, estimated pup survival among 18 in utero litters of primary females averaged 60% to autumn, but

survival varied with pack social structure. In utero through early autumn pup survival appeared to be lower in pairs with no previous offspring than in larger packs with offspring from previous years (0.48 vs. 0.65,  $p=0.13$ ). Exploitation contributed to initial high pregnancy rates and multiple littering, but some packs produced multiple litters by reproductively co-dominant females in the absence of exploitation.

**Use of Periodic Sampling to Estimate Wolf Predation Rates During Winter  
Presented by Mark McNay at the 15<sup>th</sup> North American Interagency Wolf Conference  
Chico Hot Springs, Montana  
April 2003**

Mark McNay and Jay Ver Hoef

Alaska Department of Fish and Game, Fairbanks, AK 99701 (MM)  
Alaska Department of Fish and Game, Fairbanks, AK 99701 (JV)

**Abstract:** Estimates of wolf predation rates on ungulates are often drawn from observations of wolf packs on consecutive days during specified time periods in early winter or spring. Consequently estimates can be biased by seasonal variation in prey selection, prey vulnerability, wolf pack size and wolf pack composition. We developed a periodic sampling design to reduce those biases when estimating wolf kill rates. Sampling required aerial surveys of several wolf packs during 11, 4-day periods randomly distributed throughout the winter (late October to mid-April). Computer simulations suggested we could obtain a 90% C.I. of  $\pm 24\%$  of the true kill value. We applied the sampling design in the field during winters 1998-99 and 2000-2001 within a 5,500 km<sup>2</sup> study area lying along the north side of the Alaska Range in central Alaska. We monitored 12 wolf packs in 1998-99 and 8 wolf packs in 2000-2001. During the 2 winters we detected 138 sites where wolves killed moose, caribou, or Dall sheep. We examined remains from 105 of those kills to determine sex, age, and condition of ungulates killed by wolves. Moose represented 90 and 98% of the ungulate biomass in the wolf diets during winters 1998-1999 and 2000-2001 respectively. Wolves killed moose at a mean rate of 29.1 moose per pack per winter (90%CI= 23.2-25.1 moose per pack per winter). Per wolf consumption rates averaged 7.0 kg/wolf/day (90%CI=5.5-8.4 kg/wolf/day). Calf and yearling male moose were taken disproportionately to their occurrence in the population.

**VII. PROJECT COSTS FOR THIS SEGMENT PERIOD**

FEDERAL AID SHARE \$ 60,085 STATE SHARE \$ 20,028 = TOTAL \$80,113

**VIII. PREPARED BY:**

Mark E. McNay  
Wildlife Biologist III

**SUBMITTED BY:**

Mark E. McNay  
Research Coordinator

**APPROVED BY:**

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Thomas W. Paul  
Federal Aid Coordinator  
Division of Wildlife Conservation

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Matthew H. Robus, Director  
Division of Wildlife Conservation

**APPROVAL DATE:** \_\_\_\_\_